

## Supplemental Finding for Shenandoah Salamander (*Plethodon shenandoah*) Recovery Plan

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### BACKGROUND INFORMATION

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, “objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list.” It is possible that for some species, however, delisting cannot be foreseen at the time a recovery plan is written. In some rare cases, information is so limited that it is not possible to identify delisting criteria. This would be an unusual case, such as one in which the species’ threats are not understood well enough to identify priorities and appropriate mitigation.

A 2006 Government Accountability Office (GAO) audit of the National Marine Fisheries Service’s (NMFS) and the U.S. Fish and Wildlife Service’s (USFWS) endangered species recovery programs recommended that the Secretaries of the Department of Commerce and the Interior direct their staff to ensure that all new and revised recovery plans have either recovery criteria evidencing consideration of all five delisting factors or a statement regarding why it is impracticable to do so (GAO 2006). Since the 2006 GAO audit, we have updated our recovery planning and implementation guidance (NMFS and USFWS 2010), and new plans have included determinations regarding the feasibility or possibility of incorporating delisting criteria related to each of the five factors, as recommended by the GAO. Active recovery plans remain, however, that lack delisting criteria and contain either an incomplete determination regarding the practicability of incorporating delisting criteria, or are silent about the absence of delisting criteria in the recovery plan. In this document, we clarify why it remains impracticable to incorporate delisting criteria for the Shenandoah salamander in the Shenandoah Salamander (*Plethodon shenandoah*) Recovery Plan.

### METHODOLOGY USED TO COMPLETE THE FINDING

In 1994, competition by a native congener, the red-backed salamander (*Plethodon cinereus*), was thought to be the sole threat to the endangered Shenandoah salamander. In the absence of any anthropogenic threats, the USFWS determined that it was not possible to establish criteria to delist or downlist in the foreseeable future. The species is endemic to the higher elevations and

cool temperatures of talus slopes of three mountains in the Shenandoah National Park, and its entire range is protected by the National Park Service (NPS). Therefore, human impacts (i.e., trampling, habitat destruction) are minimized.

Although competition remains a threat, the original analysis based on the best available science at the time of the 1994 recovery plan has been brought into question. Starting in 2007, surveys and monitoring of the species became more consistent, and the NPS, USFWS, U.S. Geological Survey (USGS), Smithsonian Institution, and Virginia Department of Game and Inland Fisheries dedicated more funds and time to research, documenting population trends and understanding threats (NPS 2010). Evidence suggests that climate change may be a primary threat to the species and may influence competition (Sevin 2014, Dallalio et al. 2017). Additionally, Grant et al. (2018) found that cloud base elevation, which is dictated by climate variables, is likely to continue to shrink the suitable range of this higher elevation species. Due to a lower habitat suitability limit driving the species upward and an upper limit at the top of the mountain range, migration, if possible, is highly limited (Dallalio et al. 2017).

Studies to begin in 2020 by the NPS and USGS will focus on answering why the Shenandoah salamander is exhibiting greater declines than most amphibian species. Biologists plan to develop an adaptive management plan at the conclusion of the study.

## **FINDING**

At this time, although there has been new information since the recovery plan was developed in 1994, information is so limiting and inconclusive that priorities and mitigation cannot be identified. The completion of the USGS and NPS study in 2022 will coincide with the initiation of the next 5-Year Review (scheduled to be initiated in 2022) for the Shenandoah salamander, and at that time the USFWS can assess the practicality of amending the recovery plan to include delisting criteria and update the plan to include additional threats identified.

## **References:**

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